of experimental skill and have perhaps never been sufficiently appreciated.

His later researches were concerned with the peroxides, the constitution of Caro's acid, and particularly with the constitution of the oxonium salts and of the coloured derivatives of triphenylmethane, and his last research, published in 1911 together with Jean Piccard, was on the oxonium salts derived from dimethylpyrone (*Annalen*, ccclxxxiv., 208, 224).

W. H. PERKIN.

NOTES.

THE announcement made by the Admiralty on Saturday that "an attack was made on our vessels patrolling the Belgian coast by an electrically controlled high-speed boat" (which was destroyed in the attempt) recalls the various suggestions and experiments made, ever since Hobson's "bottling" exploit at Santiago, to devise an unmanned craft capable of being steered for attack from a safe distance. Brennan's wire-controlled torpedo was a clumsy device compared with the radiotelegraphic control worked out by J. H. Hammond in America, and tested before the present war commenced. There is no doubt that it is possible to construct a craft steered by wireless which will attack and hit a target two or three miles off. The difficulty of seeing the craft at such distances from the steering station can be overcome at night by attaching to it a light directed backwards and invisible from the target. But the main objection to wireless control is that it can be "jammed" by the enemy. To meet this difficulty it has been proposed to use a selenium control actuated by a searchlight. There is little doubt that this can be successfully worked over a range of several miles, but here again the objection is that something must emerge and be illuminated, and that this something is liable to destruction by the enemy. The question resolves itself into one of adaptability to exceptional circumstances. It will be interesting to learn which of the various possible constructions has been adopted by Germany. The Press Association is authorised to state that four electrically controlled boats have already been destroyed. The boat destroyed last week had a petrol engine, was electrically controlled from the land, and was convoyed by an aeroplane.

AN article of considerable length upon the stabilisation of aeroplanes and ships by means of the gyroscope appears in *La Nature* for October 20. The apparatus designed by Sperry for these purposes is described in some detail. The application to the case of ships and the superiority of Sperry's stabiliser to that of Schlick are fairly well known, but the application to the aeroplane is perhaps less familiar and deserves a word of comment. The claims made for the apparatus are that it relieves the pilot of all control except that of the rudder, and that the machine will continue to fly for almost any length of time at the attitude for which the gyro controls are set. But this is also true of an inherently stable machine, and inherent stability can be obtained without any addition of weight and without any increase of head resistance such as that due to the windmills which drive the servo-motor and generator of the Sperry apparatus. The Sperry stabiliser may be of some utility for large aeroplanes used for commercial purposes or long passenger flights, but it is certainly not required for military aircraft. One of the greatest necessities for the military machine is flexibility of control and ability to execute manœuvres, such as looping, spinning and steep nose-diving. For such a machine the Sperry stabiliser is worse than useless; indeed, the construction of the apparatus appears to be such that looping the machine would completely derange the adjustment. The additional weight of the apparatus and the extra head resistance involved are serious drawbacks to its use in any machine, and the great complexity of its mechanism is antagonistic to the best principles of aeroplane design—simplicity and directness of control.

THE Journal of the Royal Society of Arts for October 19 contains an extensive extract from Capt. B. C. Hucks's paper entitled "A Further Three Years' Flying Experience," which was read before the Aeronautical Society last June. This paper is an exceedingly interesting one, coming from such an experienced pilot, and contains many points of scientific interest. Possibly the most interesting of these is the question of flight in a cloud, or when the earth is not visible. Capt. Hucks vividly describes his own experience of such flights, and states that in gusty weather it is exceedingly difficult to keep the machine on a straight path, and that once control is lost it is almost impossible to regain it until out of the cloud. The air-speed indicator and other instruments fitted do not give sufficient indication of the machine's actual motion through space, and Capt. Hucks suggests that some instrument should be fitted which shows a line fixed in space, whatever be the motion of the machine. Such an instrument must apparently depend either on the earth's magnetic field or on gyroscopic action, and the latter seems the more promising. The chief difficulty in designing an instrument of this kind is to render the supporting gimbals sufficiently frictionless, as friction will cause the gyroscope to deviate from its initial position. It seems doubtful if an instrument can be made for continuous use throughout a long flight, but it should be quite possible to design one for intermittent use. The instrument could be set with the gyro axis in some definite direction, such as the vertical, when the machine was flying normally, and then set free when a cloud was encountered. The gyro would maintain its direction sufficiently well for a short time, and could be reset whenever an opportunity afforded. Such an instrument should prove an interesting problem in design for the scientific inventor, and would undoubtedly be a valuable addition to the instrument board on an aeroplane.

WE notice with much regret the announcement of the death on November 4, at forty-five years of age, of Mr. W. Duddell, F.R.S., C.B.E., past-president of the Röntgen Society and of the Institution of Electrical Engineers.

WE regret to announce the death on November 4, at seventy-two years of age, of Sir David C. McVail, professor of clinical medicine in St. Mungo's College, Glasgow, from 1889 to 1906, and author of a number of publications on physiological subjects, especially on diseases of the heart and lungs.

THE following is a list of those who have been recommended by the president and council of the Royal Society for election into the council at the anniversary meeting on November 30:—*President*, Sir J. J. Thomson; *Treasurer*, Sir A. Kempe; *Secretaries*, Prof. A. Schuster and Mr. W. B. Hardy; *Foreign Secretary*, Prof. W. A. Herdman; *Other Members of the Council*, Dr. H. K. Anderson, Sir G. T. Beilby, Prof. G. C. Bourne, Prof. A. R. Cushny, Dr. M. O. Forster, Prof. P. F. Frankland, Dr. J. W. L. Glaisher, Prof. B. Hopkinson, Mr. J. H. Jeans, Prof. W. H. Lang, Major H. G. Lyons, Dr. W. H. R. Rivers, Prof. C. S. Sherrington, Prof. R. J. Strutt, Mr. J. Swinburne, and Prof. W. W. Watts.

AT the annual general meeting of the London Mathematical Society, held on November 1, the president announced the award of the de Morgan medal to Prof. W. H. Young, and stated that, owing to Prof. Young's absence from England, the medal would be given into the charge of the Master of Peterhouse. The following were elected as council and officers for 1917–18:—*President,* Prof. H. M. Macdonald; *Vice-Presidents,* Prof. H. Hilton, Prof. E. W. Hobson, and Sir J. Larmor; *Treasurer,* Dr. A. E. Western; *Secretaries,* Dr T. J. I'A. Bromwich and Mr. G. H. Hardy; *Other Members of the Council,* Prof. W. Burnside, Dr. S. Chapman, Mr. A. L. Dixon, Miss H. P. Hudson, Mr. A. E. Jolliffe, Mr. J. E. Littlewood, Prof. A. E. H. Love, Major P. A. MacMahon, and Prof. J. W. Nicholson.

THERE is a widespread feeling of regret among metallurgists and chemists at the death of Mr. G. T. Holloway, which occurred, after a long and painful illness, on October 24. Mr. Holloway entered the Royal College of Science in 1881, and obtained the associateship in chemistry in 1884. He was assistant-demonstrator in chemistry in the college from 1884 to 1886. He spent some time in Newfoundland, and, returning to England, established a practice as analytical and consulting metallurgist in Chancery Lane. This practice was afterwards transferred to testing works and laboratories in Limehouse, and the business conducted in the form of G. T. Holloway, Ltd. He specialised in some of the less common metals, and few had more knowledge of their occurrence or methods of treatment. Mr. Holloway was a fellow of the Institute of Chemistry and a member of various other societies. He was specially interested in the Institution of Mining and Metallurgy, on the council of which he served for many years. He had considerable experience as an examiner, having acted in this capacity for the University of Birmingham, the Institute of Chemistry, and other bodies. His most recent work, and that perhaps by which in future he will be best known, was the chairmanship of the Canadian Government Commission on nickel. The report of this commission has been issued during the present year, and will long be a standard of reference and a model of what such reports should be. Handicapped from the first by pecuniary circumstances, permanent lameness, and a weak constitution, he had a remarkably clear intellect and a charming personality. He lived to accomplish more than many men who had all the advantages which he lacked. For one who found all physical effort a trial he was wonderfully active and had travelled considerably.

PROF. DASTRE, whose death was announced in NATURE of October 25, was one of the most distinguished pupils of the great physiologist, Claude Bernard. Another pupil, Paul Bert, succeeded Bernard in the chair of physiology at the Sorbonne, and, on Bert's death in 1886, Dastre was elected to the post. Portraits of all three of these noted men are to be seen in the well-known picture by Lhermitte, in which Dastre is represented as taking notes of an experiment shown by Bernard to a number of his friends. Dastre was for many years one of the editors of the *Journal de physiologie et de pathologie générale,* and his kindness in offering to *Physiological Abstracts,* on its foundation, the free use of the excellent abstracts published in his journal was much appreciated by British physiologists. His work in research covers a wide field, both in chemical and in what is sometimes called "experimental" physiology, but that done in conjunction with Prof. Morat on the vasomotor system of nerves is perhaps best known. In this work the existence of vaso-dilator nerves was shown to be more general than had previously been supposed, and much new light was thrown on the functions of the sympathetic nerves. Allied to these problems we find experiments made in order to elucidate the relations between the nervous regulating mechanism of the heart and the functions of the muscular structure itself. A number of papers was published relating to the digestion and metabolism of fats and sugars. The part played by the bile in the digestion and absorption of fats was pointed out. Of other important work, the rapid accommodation of the vascular system to the injection of large amounts of saline solutions and the method of mixed anæsthesia with morphine and chloroform may be mentioned. Contrary to general opinion at the time, Dastre showed that expired air does not contain any toxic substance. He also devoted some attention to the more morphological problems of embryology.

MR. WORTHINGTON G. SMITH, whose death was announced in NATURE of November 1, was a man with varied interests and a broad outlook. A good townsman (he was the first Freeman of Dunstable to be elected since the foundation of the borough by Henry I.), a keen politician, originally by profession an architect, a draughtsman and engraver, an antiquary of note, he was also among the first botanical artists in black and white, and an admitted authority on the larger British fungi. At the age of twenty-three he gave up the practice of architecture in favour of book illustration, and for many years drew architectural subjects for the *Builder.* Plant-forms, and especially the larger fungi, had attracted him, and in 1867 he drew, lithographed, and described two large coloured sheets of "Edible and Poisonous Mushrooms" for Mr. Hardwicke, the publisher. In 1869 he was discovered by Dr. Maxwell Masters, and from then onwards for nearly half a century supplied the drawings of new or noteworthy plants with which readers of the *Gardeners Chronicle* are familiar. To his training as an architect we doubtless owe the sharp, clear accuracy of his drawings and his careful attention to detail. In 1884 was published his "Diseases of Field and Garden Crops," chiefly such as are caused by fungi, written and illustrated by himself. A beautiful memorial of his work on the larger fungi is exhibited in the botanical gallery at the Natural History Museum in the form of more than a hundred large sheets of coloured drawings of our British species. His "Synopsis of British Basidiomycetes," published by the trustees of the British Museum in 1908, is descriptive of these drawings. His "Guide to Sowerby's Models of British Fungi" (British Museum, 1891) is a capital little handbook on the larger species. Many of his drawings have been acquired by the museum, including a fine series illustrating the larger British fungi. Worthington Smith was a fellow of the Linnean and various other societies, and in 1903 he was elected president of the British Mycological Society. The Royal Horticultural Society showed its appreciation of his work by several awards, including the Knightian gold medal in 1895 for his researches into the life-history of the potato-disease fungus. An appreciation of Worthington Smith's work, with an excellent portrait, forms the leading article in the issue of the *Gardeners' Chronicle* for November 3.

THE trustees of the British Museum have issued three more of the useful pamphlets (Nos. 4, 5, and 6) of the "Natural History Economic Series." These describe mosquitoes, the bed-bug, and species of Arachnida and Myriopoda injurious to man, and are written respectively by Mr. F. W. Edwards, Mr. Bruce F. Cummings, and Mr. Stanley Hirst. The outward form, life-histories, and habits of the various creatures are clearly described, with good figures and some practical advice for the destruction of pests. Most readers of the last-named pamphlet will be surprised to learn of the number of species of centipedes and millipedes which are recorded as accidental inhabitants of the human intestine.

The extreme severity of the winter of 1916–17 levied a heavy toll on the birds throughout the British Islands, and it seems to have borne no less heavily on our native flora. Not even Ireland escaped. Mr. C. B. Moffat has already placed on record a number of observations as regards the birds of Ireland, and he now follows these up with a similar survey of the havoc wrought among the native plants of Co. Wexford. In the *Irish Naturalist* for October he tells us that at least five species of plants have been so reduced that it seems doubtful whether they will recover their former plenty. These are the weld (*Reseda luteola*), pale-flowered flax (*Linum angustifolium*), fleabane (*Pulicaria dysenterica*), greater broomrape (*Orobanche major*), and the lesser broomrape (*O. minor*).

A valuable and illuminating summary of what is known of the habits and migrations of Chimæræ off the Scandinavian coasts and the northern waters of our own shores is given by Prof. D'Arcy Thompson in the *Scottish Naturalist* for October. Though his survey includes two species, *Chimaera monstrosa* and *C. mirabilis*, his remarks are mainly concerned with the former species. Hitherto it has been generally supposed that this spawned only in deep water, but it is now shown to spawn off the Norwegian coasts in shallow water in winter-time, and to migrate to the depths during spring and summer. Prof. Thompson is disposed to regard these migrations as governed by temperature rather than by the search for food; for the species shows a partiality for cold or cool water, and while in general it finds this optimum temperature in the deeper waters outside the continental shelf, so also it finds it in winter, but then only in the shallow coastal waters of Norway. Many gaps, however, in our knowledge of these migrations yet remain to be filled; for it is pointed out that from its occurrence more or less all the year round off the south-west of Ireland we are precluded from supposing that the various localities where the species has been found lie in one continuous and regular route of migration. We cannot correlate what we know of it in Norway, in the northern North Sea, and off the Hebrides with what we know of it in the Bay of Biscay, the south-west of Ireland, and the Faröe Channel. It seems, on the whole, probable that in its more southern and more western habitats the habits of the species are different from those in the north; that it is here confined to deeper waters, but that it tends to resort periodically to still deeper parts of the ocean, where it chiefly spawns.

Dr. J. D. F. Gilchrist has sent to us a note on luminosity in South African earthworms. He refers to the Rev. Hilderic Friend's interesting letter in Nature (vol. xlvii., 1893, p. 462) for earlier records, and states that other cases have been noticed since then. Opinions are, however, divided as to the source of the phosphorescence, the latest suggestion being that it is due to luminous fungi. During a dark and damp evening Dr. Gilchrist observed bright patches on the ground in a pinewood on the slopes of Table Mountain. These were traced to earthworms, specimens of which when dug up discharged a viscid luminous fluid from the mouth, and usually from the anus as well. Phosphorescent patches seen on the body were attributed to portions of this discharge, perhaps scattered by the movements of the worm; but they may have been due to something given out from an injury to the body. The luminous discharge contained numerous nucleated, granular cells, some of which showed active movements, and resembled Gregarines. Dr. Gilchrist thinks he has found sporoblasts and spores which confirm this view of their nature. The proof that the cells were luminous was obtained by examining them under the microscope, in a dark room, by means of their own light. The fluid containing them, when dried at 60° C., recovered its luminosity when breathed on or otherwise moistened. A useful survey of what is known in regard to the production of light by animals will be found in papers by Prof. U. Dahlgren, referred to in recent volumes of Nature (vol. xcvii., p. 146; vol. xcix., pp. 191, 430).

With the continued improvement of cytological methods our knowledge of the minute details of the growth and maturation of the germ-cells is constantly increasing. At first attention was focussed upon the remarkable changes undergone by the nucleus and the mechanism of nuclear division during these processes, with results which are now well known to every serious student. More recently a large amount of laborious research has been devoted to the behaviour of the cytoplasm and its various inclusions—mitochondria, macromitosomes, micromitosomes, acroblasts and acrosomes, to mention only some of the numerous terms employed by recent investigators. The story of the behaviour of these enigmatical bodies is scarcely less remarkable than that of the behaviour of the nucleus, and may well be regarded as affording some justification for the view that the cytoplasm plays an important part in the transmission of inherited characters. To those who have not followed the gradual elaboration of this story by various writers a memoir in the current number of the *Quarterly Journal of Microscopical Science* (vol. lxii., part 3), by Mr. J. Bronté Gatenby, will come almost as a revelation. It deals with the cytoplasmic inclusions of the germ-cells in Lepidoptera, a subject which is far too complex to be adequately summarised in this place. This memoir is a veritable triumph of microscopical technique, and the numerous figures by which it is illustrated are remarkably beautiful and convincing. As a clear exposition of the latest views on the subject, as well as for the sake of the new results which it deals with, it should meet with a hearty welcome from all biological students.

Agricultural problems are largely represented in recent numbers of the *Atti dei Lincei*. Thus Prof. Alfonso Splendore (vol. xxv., 2, p. 12) describes researches on the bacterial parasites of the field mouse (Patymys) with a view to their application to the extermination of these pests. The parasitic fungi which give rise to the so-called "ink disease" in chestnut trees are discussed by Dr. L. Petri in the same number. Dr. Mario Topi (vol. xxvi., 1, p. 4) gives statistics showing the effect of arseniate of lead and tobacco in destroying the larvæ of the Tineæ, which attack vines. Dr. Benjamino Peyronel (vol. xxvi., p. 9) describes a potato disease new to Italy, due to the fungus *Spondylocladium atrovirens*, which was first discovered in Vienna on the tubers of potatoes in 1872, and described by Johnson as occurring in Ireland in 1903. It would appear, however, that though this fungus is difficult to destroy chemically, its effects on the tubers are mainly superficial. In a later number (vol. xxvi., p. 11) Prof. Vittorio Peglion discusses the Peronospora of the hemp (*P. cannabina*), which is referred to a new subgenus, and of which the life-history is still in doubt. The same writer, in a later number (vol. xxvi., 1, p. 12) discusses the gummy fungus which is at present threatening the apricot trees in Emilia, and is referred to the genus Sclerotinia. It appears to attack the flower, fruit, and all parts of the apricot.

The October number of the *Journal of the Board of Agriculture* contains several articles of interest relating to seeds. A summary is given of the more general measures taken by the Governments of British Dominions and of foreign countries with the object of eradicating weeds and providing pure seeds. The summary deals mainly with measures for the prevention of the importation of weed seeds, restrictions on the internal sale of seeds, and control stations for analyses of seeds. It is of interest to note that the reproach that England is almost the only important country having no adequate seed regulations and no official seed-testing station is about to be removed, as it is announced that an official seed-testing station for England and Wales is being organised at the Food Production Department. The station will be under the direction of Mr. R. G. Stapledon, adviser in agricultural botany to University College, Aberystwyth. Other articles in the same number deal with seed production in Canada and economy in the use of vegetable seeds. The latter is published separately as Food Production Leaflet No. 8, copies of which may be obtained gratis on application to the Board.

The disadvantages of the various thermometric scales in use is raised by Mr. A. McAdie, director of the Blue Hill Observatory, in a paper in the *Geographical Review* for September (vol. iv., No. 3) entitled "The Passing of the Fahrenheit Scale." The growing study of the upper air and the structure of the atmosphere has led, at least in America, to a tendency to use the Absolute scale, instead of the Centigrade or Fahrenheit. The chief advantage of the Fahrenheit over the Centigrade and Absolute scales is the smaller divisions, which give the readings more definiteness. In order to combine this feature with the advantages of the Absolute scale Mr. McAdie proposes a new scale, for which he has found no name. Zero is the same as in the Absolute scale (−273·02° C.), and freezing point is 1000. The divisions are considerably smaller than on the Fahrenheit scale, there are no minus signs, and there is a fundamental difference between readings above and below freezing point, to cite only some of the merits which the author claims for his new scale.

The weakest part of school geography as a rule lies in the teaching of climate. Broad generalisations based on the general laws of physics, but fallacious in their application, mar the treatment of the subject in almost all school books. We welcome, therefore, an article by Mr. B. C. Wallis on the monsoon in the *School World* for October (abridged from an article written for *Indian Education*). In this article Mr. Wallis sets out the facts of the monsoon and the incidence of the monsoon rains, wisely refraining from any attempt to explain the phenomena. He gives five rainfall areas for India, each marked by rainfall intensity at one or other period of the year, and indicates the major portions of each without vainly attempting to find precise boundaries. The article, which we notice is not copyrighted, should be most useful to teachers and students in its clear presentment of facts and its absence of any striving for false simplicity. Incidentally, it is hoped that it will help to kill the long-established myth of the monsoon as gigantic land and sea breezes based on the heating and cooling of Central Asia. This fallacy is still current in school geography, despite repeated attempts by the late Prof. Herbertson to dispel it in his many text-books.

A report of the Fernley Observatory, Southport, with the meteorological results for the year 1916, under the directorship of Mr. Joseph Baxendell, meteorologist to the corporation, has been issued by the county borough of Southport. The observations are carried out with the greatest care, and the instruments and their positions are such as to render the results of the highest possible value. Close contact has been kept with the Meteorological Office, and detailed observations are supplied for the various official reports. In the statistical tables the new units of measurement are given, as well as the old. A new table is given which shows the amount, duration, and intensity of rainfall for each eight points of wind direction. For the year 1916 the largest amount of rain fell with south-west and south winds, the measurement being six times as great as with a north wind. The duration of rainfall was greatest with south-west, west, and south-east winds. A "discontinuity" in the amount of rainfall for the several months of the year is shown by the series of observations. During the twenty-six years from 1871 the average rainfall for July is given as 3·64 in., whilst during the subsequent nineteen years it was only 2·25 in.; September in the earlier series has 3·46 in., and later only 2·38 in. The later series of observations shows that all the months July to November have become drier, whilst six out of seven of the remaining months, December to June, have actually become wetter. Older records in the district show the change in the character of the weather to be subject to periodic variation.

Recent writers on the subject of optical glass have shown a tendency to assign the whole of the credit for the introduction of the newer materials like baryta, magnesia, and the phosphates into glass-making to Abbe and Schott, of Jena. In an editorial note in the *British Journal of Photography* for October 19 it is pointed out that baryta has been used in glass-making since 1830, and that both Fraunhofer and Faraday made boro-silicate glass, Schroeder made magnesia glass, Maïs used zinc oxide, both Harcourt and Stokes made phosphate glasses, while French glass-makers have used thallium and fluorides for some time. The journal claims that some of the credit for the introduction of the newer materials now used in glass-making should be given to these pioneer workers.

What is called the "uniform movement" of flame occurs when an inflammable mixture of gases is ignited at the open end of a horizontal tube closed at the other end. Messrs. W. A. Haward and S. G. Sastry (Journal of the Chemical Society, September, 1917) have determined the speeds of this uniform movement in mixtures of acetylene and air. When these speeds (obtained with a glass tube 12 mm. in diameter) are plotted against the percentages of acetylene, a curve is obtained which rises rapidly from 3 per cent. of acetylene to a maximum at 8–10 per cent., and then falls more slowly to 20 per cent. of acetylene. Mixtures richer than the last in acetylene deposit soot when burnt, and the propagation of flame is slow. There is a gradual flattening of the curve towards the limits of inflammability, as in other inflammable mixtures. Previous experiments with mixtures of acetylene and air, by Le Chatelier, led him to depict the results by a curve consisting of three straight lines, the first to a maximum at 10 per cent. of acetylene, the second falling from this maximum, and the third (from 20 per cent. acetylene to the limit of inflammability) corresponding with combustion with a fuliginous flame. As stated, the authors obtained a smooth curve not consisting of straight lines.